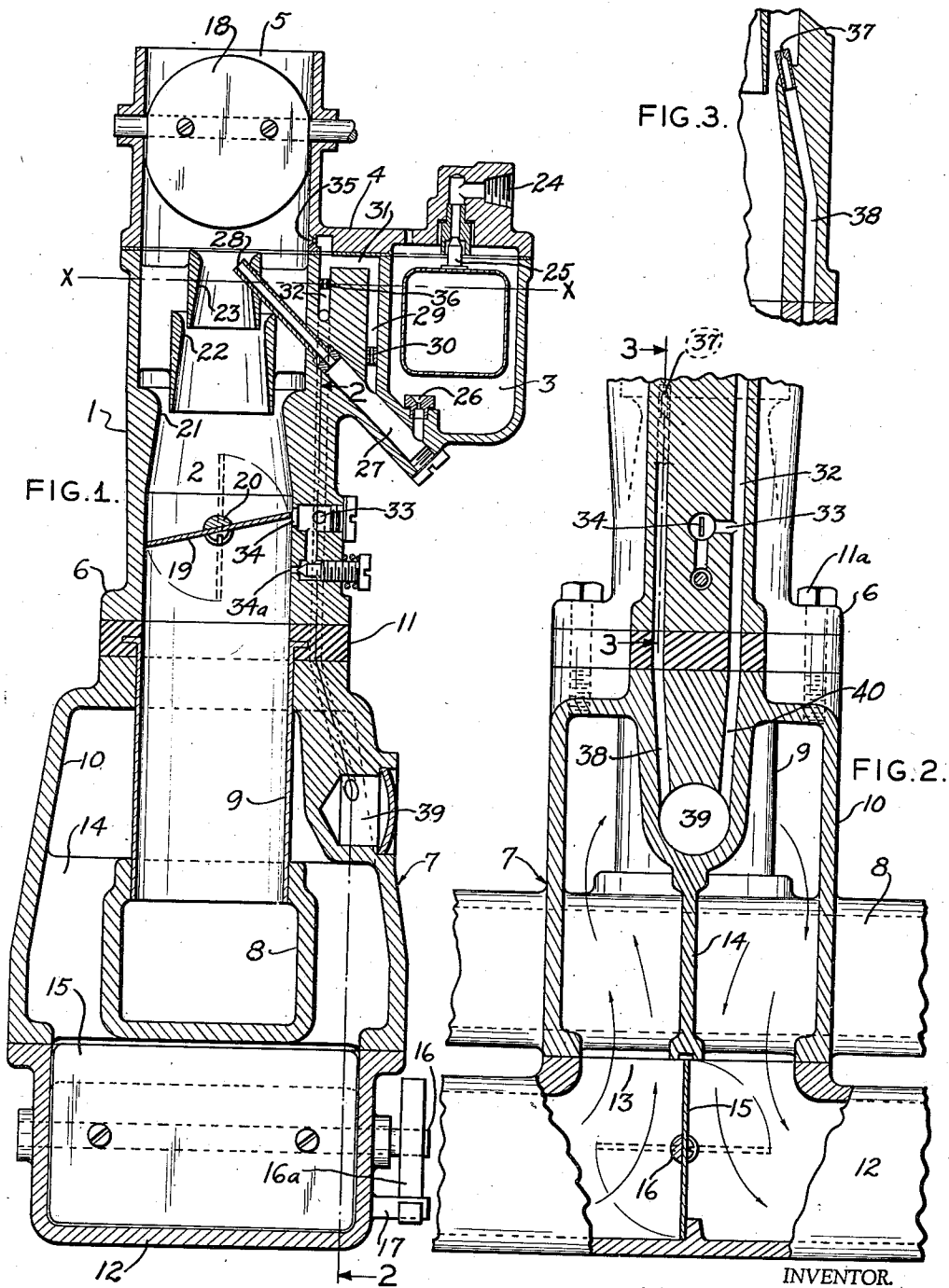


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CARBURETOR DEFROSTER

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CARBURETOR DEFROSTER

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This invention relates to carburetors for internal combustion engines and resides in novel means for defrosting the idling discharge ports.

During engine operation, under certain atmospheric conditions, frost and ice frequently forms and adheres to the walls of the carburetor mixing conduit. This, of course, is due to moisture laden air striking the walls of the mixing conduit which have been cooled by fuel evaporation. In downdraft carburetors this is most likely to occur during the warming up period; that is immediately after starting and before the engine and associated parts have reached normal operating temperatures. The condition has been aggravated by the insertion of non-conducting spacers between the engine manifold and the carburetor, the use of which was found necessary to prevent too much heat conduction from the engine to the carburetor during high temperature operation.

The point at which frost and ice accumulations most readily occur and cause the greatest difficulty is the area in and adjacent the idling discharge ports. In most current constructions the idling port or ports discharge adjacent the edge of the throttle valve and it will be appreciated that the extremely high velocity and consequent high rate of evaporation at this point is conducive to the formation of local frost and ice accumulations when moisture is present. It will also be appreciated that such accumulations in and around the idling ports and the adjacent edge of the throttle will seriously affect idling operation. While numerous arrangements for heating the carburetor conduit or the air admitted thereto have been proposed, any such arrangement which involves heating an appreciable portion of the carburetor structure or the air admitted thereto obviously has the effect of reducing volumetric efficiency.

The present invention has for its primary object the provision of a carburetor in which novel means for applying a comparatively small amount of heat directly to the idling system is incorporated.

It is a further object of the present invention to provide a carburetor having an idling system in which novel means for heating the idling fuel is incorporated.

It is a further object of the present invention to provide a carburetor having an idling discharge port discharging into the main mixture conduit, and including novel means for supplying a heated mixture of fuel and air to said idling port.

It is a further object of the present invention to provide a carburetor of the above character in which the temperature of the idling mixture is varied by a heat responsive device.

Other objects and advantages will appear upon reference to the following specification and accompanying drawing. Referring to the drawing:

Fig. 1 is a vertical cross section through an engine intake manifold and heating jacket and an attached carburetor constructed in accordance with the present invention.

Fig. 2 is a fragmentary vertical section taken on line 2—2 of Fig. 1.

Fig. 3 is a fragmentary section taken on line 3—3 of Fig. 2.

Numeral 1 indicates the main body portion of a downdraft carburetor having a downwardly directed mixing conduit 2 formed therethrough and having a constant level fuel chamber 3 formed integral therewith. Attached to the top of body member 1 is a combination air inlet and fuel chamber cover casting 4 having an air passage 5 formed therethrough. The lower end of body member 1 terminates in a flange 6. Numeral 7 generally indicates an intake manifold casting comprising the horizontal intake conduit 8, and a surrounding heating jacket 10. A non-conducting spacer 11 is inserted between the carburetor flange 6 and the upper face of the intake casting 7. Bolts 11a are employed to attach the carburetor to the intake casting 7. The rising conduit 9 is indicated as being formed as an insert in the non-conducting member 11 which is a commonly used arrangement.

Attached to the lower face of casting 7 is an exhaust manifold pipe 12 having an opening 13 communicating with the interior of heating jacket 10. The jacket interior is divided for some distance upward from the bottom by a vertical wall 14. A valve 15 attached to a shaft 16 which is journaled in the walls of the exhaust manifold directs exhaust gases through the jacket 10 as indicated by arrows when in the position shown. When the valve 15 is moved to the position indicated by dotted lines in Fig. 2, the exhaust gases are permitted to take a direct path through the exhaust manifold 12 thereby bypassing the jacket. Mounted on the projecting end of shaft 16 is a temperature responsive, bimetallic, spiral 16a having its inner end attached to shaft 16 and its outer end abutting a stop 17 and being so constructed as to respond to increasing temperatures to move valve 15 toward a by-passing position as shown by the dotted line. The air inlet of the carburetor is con-

trolled by a disk-type choke valve 18 which may be operated in any suitable manner, and the outlet of mixing conduit 2 is controlled by a disk-type throttle valve 19 mounted on a rotatable shaft 20. The mixture conduit 2 is provided with a Venturi form constriction 21 and concentric Venturi tubes 22 and 23. Fuel is admitted to the fuel chamber 3 through the inlet 24 which is controlled by the float needle 25 in such manner as to maintain a substantially constant level of fuel as indicated by dot-dash line x-x.

Fuel is supplied to the mixing conduit for all operation except during idling through the metering restriction 26, the passage 27, and the main fuel nozzle 28. During idling operation, fuel is supplied to the mixing conduit through the restriction 26, passage 27 and thence through an idling system which comprises a passage 29 having a metering restriction 30 therein, a passage 31, passages 32 and 33 and is discharged adjacent the upward opening edge of throttle disk 19 through a vertically elongated port 34 and an adjacent regulable port 34a. The idling system further comprises an air bleed 35, a mixture restriction 36 and a warm air bleed opening into the mixing conduit at a point 37, see Figs. 2 and 3. The warm air bleed comprises the calibrated orifice 37, passage 38, warm air chamber 39, and the passage 40 which joins the passage 33. The method of heating the air bled at 37 consists of passing it through a chamber or stove 39 the walls of which are directly heated by impinging exhaust gases. In the preferred form the chamber 39 is formed as a hollow inwardly projecting boss formed integral with the wall of the intake manifold heating jacket, however, apparently any suitable chamber or stove which may be heated by exhaust gases or by any other means could be used without departing from the principle of the invention. The liquid fuel restriction 30, the emulsion restriction 36, the air bleed 35 and the warm air bleed 34 together constitute a calibration which determines the quality of the emulsion delivered at ports 34 and 34a.

The operation is as follows:

Upon starting a cold engine the valve 15 will be held in a position as indicated in Fig. 2 by the temperature responsive coil 16a. Exhaust gases will, therefore, be directed upward through the manifold heater as indicated by the arrows. This portion of the induction structure which includes the heat chamber 39 will become heated much sooner than the carburetor body which is separated therefrom by the non-conducting spacer 11. After the engine has been successfully started and when the throttle valve is moved to a position for idling (which is substantially closed) fuel and air will be drawn from the ports 34 and 34a. Air drawn into the idling system through orifice 37 will first pass through the heating chamber 39 and be warmed before joining the mixture coming through passage 32. This will have the effect of forestalling the formation of frost or ice in and adjacent ports 34 and 34a. As the engine continues to operate, it and its associated parts will, after a period, reach normal operating temperature. The temperature responsive element 14 upon absorbing sufficient heat from the adjacent exhaust manifold will act to move valve 15 to a "heat off" position as indicated by dotted lines in Fig. 2 whereafter the exhaust gas will by-pass the manifold heater and the heating of the bleeding air

entering at 37 and passing through chamber 39 will be reduced, as by this time the carburetor body will have absorbed sufficient heat by radiation and conduction to prevent the formation of frost therein.

The foregoing description and accompanying drawing are intended to be illustrative and not limiting and the use of all modifications within the scope of the appended claims is contemplated.

I claim:

1. In a carburetor, means forming a main mixture conduit, a main air inlet to said conduit, a fuel passageway leading to and discharging into said conduit, means for bleeding air to said fuel passageway, means for heating the bleeding air, and thermostatic means for regulating said heating means.

2. In a carburetor, means forming a main mixture conduit, a disk-type valve in said conduit, a fuel port discharging into said conduit adjacent an edge of said valve, a fuel passage leading to said port, means for admitting air to said fuel passage, means for heating said air, and thermostatic means for controlling said heating means.

3. In a carburetor, a main mixture conduit, a constant level fuel chamber, a main air inlet to said conduit, a disk-type throttle valve in said conduit, a discharge port opening into said conduit adjacent an edge of said throttle valve, a fuel passageway leading from said constant level chamber to said port, an air passageway communicating with said fuel passageway at a point anterior to said port, means for applying heat to a portion of said air passageway and thermostatic means for controlling the amount of heat applied thereto.

4. In a carburetor, means forming a main mixture conduit, a main air inlet to said conduit, a fuel passageway leading to and discharging into said conduit, an air bleed passageway leading to said fuel passageway, a metering restriction in said air bleed passageway, said air bleed passageway being further characterized by an enlarged portion located intermediate said restriction and the junction with said fuel passageway, and means for applying heat to the walls of said enlarged portion of said air passageway.

5. An internal combustion engine having in combination an intake manifold, a heating jacket surrounding a portion of said manifold, means for conducting exhaust gases to said jacket, a downdraft carburetor structurally connected to said jacket and spaced therefrom by a heat insulator, a mixture conduit for said carburetor, a throttle in said mixture conduit, an idling fuel passage leading to said mixture conduit and discharging therein at a point posterior to said throttle, an air bleeding passageway leading from a point in said conduit anterior to said throttle downwardly through the wall of said carburetor and through said insulator to said jacket thence upwardly through said insulator and the wall of said carburetor and connected to said fuel passage anterior to its point of discharge, said air bleeding passageway being further characterized by an enlarged portion formed as a chamber in the wall of said jacket and having a calibrating restriction at its end opening into said conduit, whereby the rate of flow is greatly reduced to permit a greater degree of heating.

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